

## SESSION 3. SUBLETHAL LEAD POISONING AND ITS EFFECTS

**Charles Stutzenbaker**, Texas Parks and Wildlife Department: It gives me a great deal of pleasure to start the third and final Workshop Session today and the General Discussion that will follow. We have really challenged this last panel because they are going to tell us about the sublethal effects of lead poisoning. If they succeed, I think they should all get a star made of real gold. Even if they can only suggest how we can learn more about sublethal lead poisoning, they should still receive a silver or a gold star.

Unfortunately, Dr. Trainer from the University of Wisconsin had a death in the family and was unable to attend this Session. He worked very hard in arranging his Session panelists. Fortunately, Dr. Louis Locke from the U.S. Fish and Wildlife Service National Wildlife Health Laboratory in Madison, Wisconsin has agreed to stand in for Dr. Trainer as the Session Leader. At this point, I'd like turn it over to Dr. Locke.

### INTRODUCTORY REMARKS: AN OVERVIEW OF SUBLETHAL LEAD POISONING

**LOUIS N. LOCKE**, Session Leader. National Wildlife Health Laboratory, U.S. Fish and Wildlife Service, 6006 Schroeder Rd., Madison, WI 53711

Up to this point everyone in this Workshop has been discussing and presenting research already conducted on lead poisoning. This Session will focus on important research that has yet to be performed: the effects of sublethal lead poisoning. Many investigators are now raising the theoretical question about what impacts sublethal amounts of lead might have on biological systems. I'd like to give you my perspective on this issue by relating some of my own experiences with sublethal lead poisoning.

Several years ago when I was still working on lead poisoning at the Patuxent Wildlife Research Center I received an Andean condor from our endangered species program. As I performed the necropsy on the bird I noted that it was emaciated and when I opened up the air sacs I

found it had a serious case of aspergillosis. Both the air sacs and the lungs were infected—it was a clear case of aspergillosis.

I then began dissecting the alimentary canal. As I did, I found a BB in the proventriculus and another one in the ventriculus. I thought that finding 2 BBs in an Andean condor was a bit unusual, for a condor is a big bird and a BB is a very little thing. Afterwards, as I continued to dissect the bird, I thought very little about the BBs. Fortunately, I saved the liver and a few organs for sectioning. I prepared some kidney sections and examined them microscopically. To my surprise I found inclusion bodies in the kidney tissue.

I went back and reexamined my autopsy report to see what I had found during the dissection; already I had forgotten about the BBs. Next, I had the liver tissue analyzed. The chemistry report showed very high levels of lead in the liver, ranging from 38-45 ppm. That was a lot of lead.

Months later I worked on a major Canada goose die-off on the eastern shore of Maryland. About a week after this incident I received a goose from another part of the eastern shore that was somehow different from the rest. Although the bird contained ingested lead shot, it had obviously died of coccidiosis. It was one of the worst cases of coccidiosis I had ever seen in a Canada goose. After this bird, we received a shipment of scaup from Wisconsin and Illinois. These birds too had died from a major coccidiosis infection. In fact I gave some of the coccidia that was isolated from these birds to another scientist who described them as a new species of coccidia. They were named after scaup, *C. affinis*.

A couple of years after that episode I gave our lead chemist some liver samples from the scaup that had died of coccidiosis in Wisconsin and Illinois. When I learned that some of the scaup had elevated levels of lead, it occurred to me that sublethal levels of lead, like some other toxicants, might have some effect on a bird's resistance to certain infectious agents. The term now applied to this phenomenon is immunosuppression. Just as I began contemplating how sublethal levels of lead might affect waterfowl and the type of research projects that were needed to investigate the problem, a couple of papers on the topic were published. With that introduction, I'd like to introduce Chris Franson from the National Wildlife Health Laboratory. Chris' paper is entitled "IMMUNOSUPPRESSIVE EFFECTS OF LEAD."